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On the Value of the Parallactic Inequality. By James Campbell, Esq., and E. Neison, Esq.

The Note by Mr. Stone in the *Monthly Notices* for June seems to call for a brief explanation from us, which we beg now to lay before the Society.

We consider that our last communication to the Society (*Monthly Notices*, March 1881) contains a satisfactory proof of the validity of the correction for the effects of the irradiation at the lunar limb which has been employed by us in our investigation. Mr. Stone would still seem to be of opinion that such proof is wanting, and merely repeats two objections shown by us in our last communication to be due to a misunderstanding and therefore to be quite untenable, as if he had overlooked this portion. We need add nothing further, therefore, on this point.

With regard to the third section of Mr. Stone's Note, the only point which seems to call for any reply is the objection he has urged that we have employed an erroneous value of the semi-diameter of the Moon in the reduction of the observations for the period 1851–1858. It appears to us that Mr. Stone's objection can be summed up as follows: These observations have been reduced by us with Adams' semi-diameter plus the correction ($-0''\cdot18$), whereas we ought to have used, as before, Hansen's value plus the correction ($+0''\cdot24$),* and consequently our results ought to be increased by +0·94, or the difference between the *mean* values of the semi-diameter according to Hansen and Adams when similarly corrected.

We dissent entirely from this conclusion.

In determining the value of the parallactic inequality it is

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* By some inadvertence Mr. Stone calls it $+0''\cdot29$.

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essential that the observations should be reduced with the observed value of the lunar semi-diameter, and if the observed value be employed it is quite immaterial what the tabular value may be. In all our results we have employed the observed value, and if no mention has been made of a correction for converting the tabular value (Adams') into the observed value, it is solely because for this particular period the observed and tabular semi-diameters coincided in value. When, however, we come to compare Adams' value for the semi-diameter founded on Adams' corrected version of Burckhardt's tabular parallax with Hansen's value for the semi-diameter founded on his own tables, it is found that a small correction ($-0''\cdot18$)* must be employed. It follows, therefore, that our results rest directly on the observed semi-diameters, and do not, as Mr. Stone supposes, require a correction for the difference between the *mean* semi-diameters of Adams and Hansen.

Mr. Stone seems to think that the same mean correction to the semi-diameter should be employed at all epochs. From this we dissent, for as the observers change, even if it be merely in the relative frequency of their observations, as they become more experienced, and as the imperfections in the tables develop themselves, so will vary the correction necessary to reduce the tabular to the observed semi-diameter.

The difficulties imagined by Mr. Stone in the last paragraph of his paper do not seem weighty: the constant difference of $+1''\cdot60$ between the results prior and subsequent to the change of instruments in 1816 is exactly what might be anticipated by the change of aperture, and its reality is clearly shown by the observations themselves. It is exactly analogous to the corresponding change which occurred in 1851, when a similar change of instruments occurred.

Mr. Stone also lays special stress on the fact that the results for the years 1846–1851 (for an examination of the results for the separate years will show that it is only these years which are discordant) do not agree with those made at earlier periods. This admitted discordance we were disposed to attribute to some change of observers at this epoch. Further examination confirms this; for it shows that towards the end of 1845 such a change did occur. For many years previous to this date the regular observers had been Mr. Henry and Mr. Thomas Ellis, but at this date Mr. Rogerson replaced Mr. Ellis. In 1846 Mr. Dunkin replaced Mr. Rogerson, but towards the middle of the year Mr. Dunkin again gave place to Mr. Rogerson. Towards the end of 1848, the practice of all four assistants taking regular part in the observations was introduced, and continued until quite lately. No very abundant material exists for comparing the observations of Messrs. Rogerson and Dunkin with those of Mr. Ellis through those of Mr. Henry, but a reduction of the

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* The value found from our own comparison was $-0''\cdot15$; that used seems to have been deduced in a similar manner at Greenwich.

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